User's Manual:

UCCI

Universal Communication Controller Improved

Serial Synchronous/Asynchronous to Network Communication Interface

Software Revision 2.04

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Chapter 1
Introduction

Congratulations on purchasing your UCCI from ADD-Engineering. The Universal Communication Controller Improved combines dedicated communication hardware with on-board data processing software to provide an efficient means of interfacing networked enabled applications located at your host system to (remote) synchronous and asynchronous Data Communication Equipment. By doing this the UCCI off-loads communications overhead from your host system's CPU for optimum system performance and creates a virtual hardware layer between your host system and the Data Communication Equipment.

Functional Description

The Universal Communication Controller Improved (UCCI) is a device that establishes the interface from standard Ethernet TCP/IP communication channels (TCP-client, TCP-server and UDP) to standard as well as "non-standard" synchronous/asynchronous systems (non-standard in terms of Commercially Of The Shelf equipment).

The UCCI can interface 8 synchronous/asynchronous systems to 8 network channels simultaneously. The UCCI supports a variety of datalink protocols like Link-1, Link-11B, SIMPLE, ATDL, HDLC, LAPB, Synchronous transparent, Asynchronous transparent and the flexible Universal-mode (which is well known from the Universal Communication Controller, UCC).

To provide flexibility and create a wide adaptation level within these different modes, the UCCI has wide a number of parameters which can be altered to interface to specific protocols. Synchronisation word, bit encoding and bit stripping are only a couple of these parameters. Though the UCCI is designed from a total new concept, a lot of its functionality on the serial communication side is comparable to that of the UCC.

The UCCI goes way beyond the functionality of the UCC in terms of flexibility, ease of installation, ease of configuration, time synchronisation possibilities, logging- and data field extraction capabilities. The UCCI provides remote monitoring and configuration of the unit by means of a standard html-based web-interface and the use of any "brand" of web-browser available. System configuration security is guaranteed by a configurable username and password combination.

Field Of Application

The versatility of the UCCI allows the unit to be employed in a large number of applications. The following is just a summary of a large range of possible applications for the UCCI:

- Interface between networked applications and UKADGE/NADGE/MASE using Link-1
- Interface between networked SIMPLE Gateways and SIMPLE synchronous communication links
- Interface between networked Ship Shore Ship Buffer applications and Link-11B synchronous communication links
- Interface between networked ASTERIX processing software and HDLC synchronous communication links
- Interface between networked tactical data link distribution and visualization software (like NIRAS) and a large number of synchronous as well as asynchronous communication links
- Interface between networked tactical data link filter software and synchronous as well as asynchronous communication links
- Interface between networked track-to-track/plot-to-track correlators and synchronous as well as asynchronous communication links
- Analysis/test tool (using the logging capability) to detect possible problems on synchronous as well as asynchronous communication links
- Interface between networked tactical data link translation software and a large number of synchronous as well as asynchronous communication links
- Remote serial ports, by using two UCCI's "back-to-back" connected to a WAN a maximum of 8 synchronous/asynchronous serial ports can be distributed across a single TCP/IP connection (using the Multiplexer functionality)
- Receive only interface between tactical data collection software and UKADGE/NADGE/MASE using the Link-1 Keep Alive functionality.

Specification Overview

DTE Synchronous/Asynchronous Interface	
Ports	8
Connector	DB25 DTE (male)
Electrical Interface	RS-232
Synchronous Speed	300, 600, 1200, 2400, 4800, 9600, 19k2, 38k4, 64k, 128k bps
Asynchronous Speed	75, 110, 300, 600, 1200, 2400, 4800, 9600, 19k2, 38k4, 115k2 bps
Stopbits (async only)	1, 2
Parity modes (async only)	None, mark, space, odd, even
Databits (async only)	5, 6, 7, 8
Clock mode	Internal, Dpll, External
Clock source	input: TxC, RxC, output: ExC
Flow Control	RTS/CTS
Sync Length (Universal Mode)	5...16 bits
Frame Length (Universal Mode)	1..254 bytes
BIt Encoding	NRZ, !NRZ, NRZI, !NRZI
Sync Stripping/Insertion (Universal Mode)	On/Off
Bit Stripping/ Insertion (Universal Mode)	On/Off
SizeHeader	On/Off
Clock inversion	On/Off
Checksum Generation (Universal Mode)	Off/Xor/Xnor
Idle State	1, 0, Alternating
Available signals	CTS, RTS, TxD, RxD, DCD, DTR, TxC, RxC, ExC

Specification of DTE interface

Network Interface	
Ports	2 (only use port 1)
Connector	RJ-45
Electrical Interface	Ethernet 10Base-T, 100Base-T
Speed	10/100 Mbps
Communication modes	TCP-client, TCP-server, UDP
Webserver port	80
Export logging port	717
Firmware upgrade port	818
Default username/password	admin/admin
Default IP-address	192.168.0.100

Specification of network interface

Power Requirements	
AC Input	115 - 230 V
Net Frequency	50 - 60 Hz
Power Consumption	25 Watt

Power requirements

Dimensions	
Case	19 inch rack mountable unit
Width	19 inch (482.60 mm)
Height	1 HU (44.45 mm)
Depth	220 mm

Dimensions

Chapter 2
Front and back panel

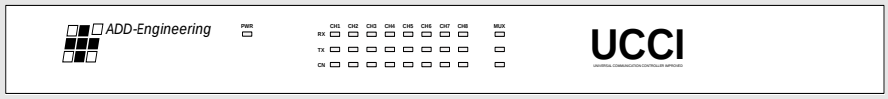
Front panel

The front panel of the UCCI is designed to provide the user a clear view on the per channel link status. A channel's status is indicated by means of three differently colored LEDs.

The red LED (top) indicates that a frame is received on the serial line, the yellow LED (center) indicates that a frame is transmitted on the serial line and the green LED (bottom) indicates the connection state of the TCP/IP connection.

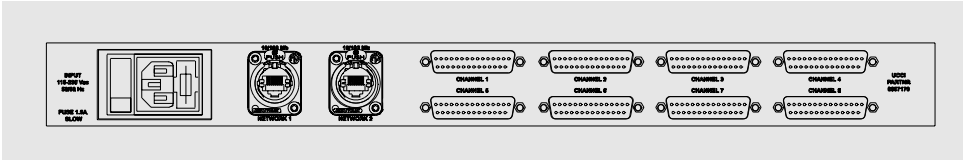
Furthermore the multiplexer LEDs (the group under MUX) provide information on the status of the network multiplexer. The LEDs indicate the same as the channel specific LEDS exept that the LEDs now indicate transmission and reception from the network.

The power LED indicates if power is applied to the unit. During the start-up phase the channel LEDs will light up from left to right (and back) and the power LED will be blinking.



Front-panel of the UCCI

Back panel



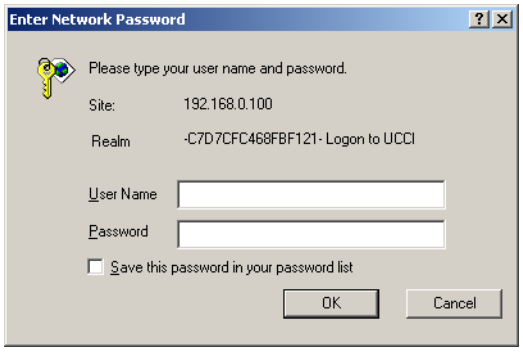
Back-panel of the UCCI

The back-panel of the UCCI holds the power switch, the fused IEC power inlet, two RJ-45 sockets for the Ethernet network connectivity and eight DB25-male connectors for serial synchronous and asynchronous connectivity. Users should use the RJ-45 socket with the designation "network-1". **When replacing the fuse for the UCCI never use a different fuse than recommended on the back of the unit (1.5A slow blow).**

Chapter 3
Web User Interface

The UCCI is equipped with a HTTP-server that provides a very intuitive web user interface. The user interface can be accessed with any **modern** standard web browser currently available (Firefox, Internet Explorer, Netscape etc).

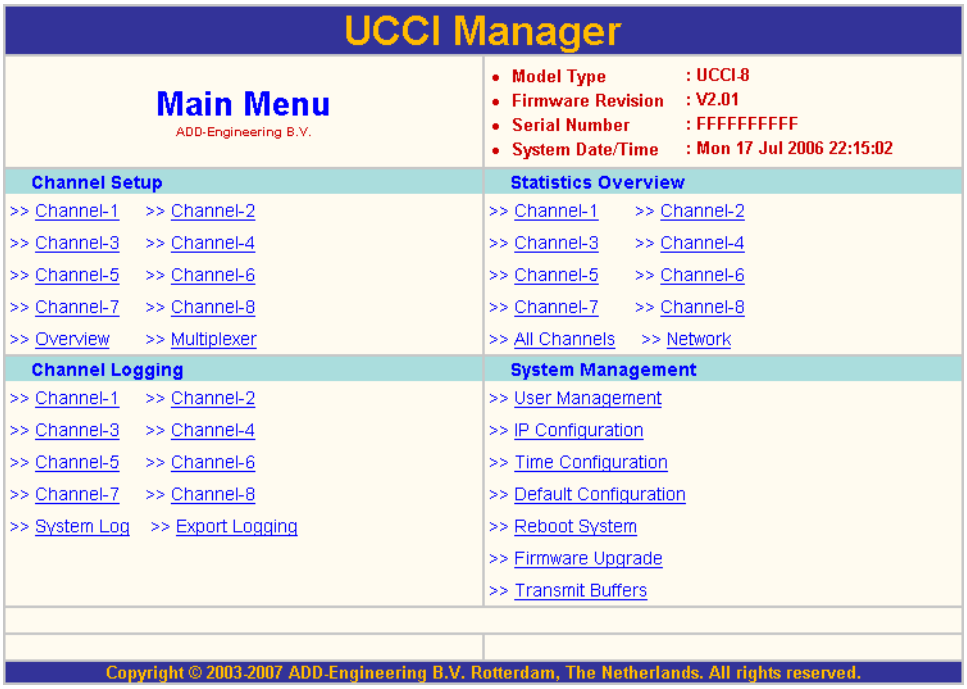
Before being able to use the web user interface the user should log on to the UCCI by providing a username/password combination.



Web user interface logon screen

The default username/password combination is **admin/admin**. It is recommended to change username/password combination after installation. The latter could protect your configuration settings from being changed by unauthorized personnel.

After the provided set of credentials has been verified and validated the main menu of the web user interface will be shown.

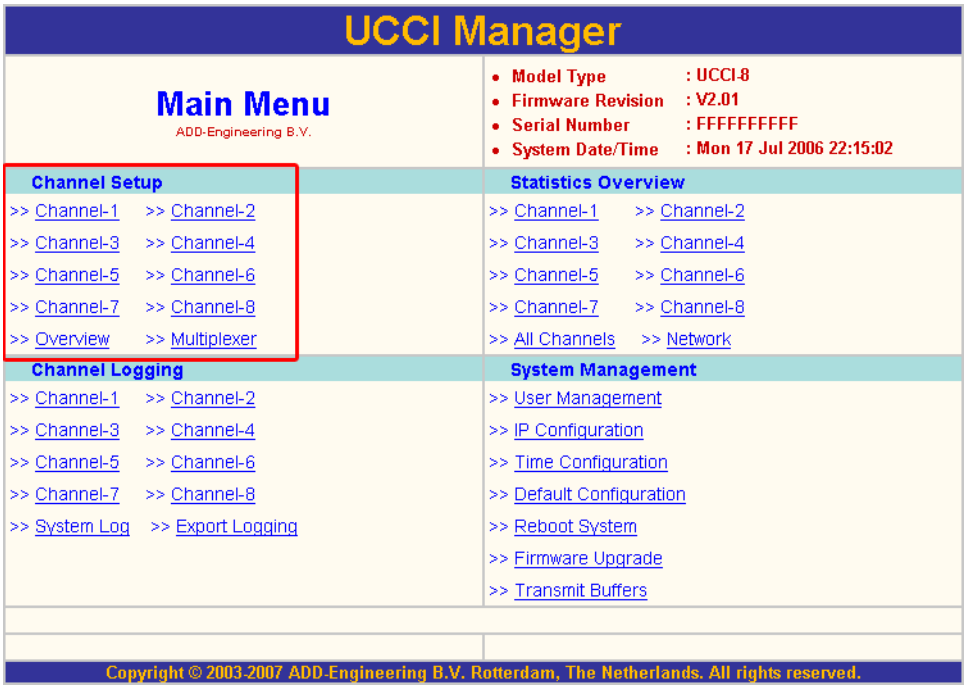


Web user interface main menu

The following chapters will discuss the function of the menu groups “Channel Setup”, “Channel Logging”, “Statistics Overview” and “System Management”

Chapter 4
Channel Setup

The Channel Setup menu group allows the user to configure the Universal Communication Controller Improved for a wide range of military and non-military protocols and electrical interfaces. The Channel Setup menu group also shows a Multiplexer and an Overview. Each of these items will be discussed separetely in this chapter.



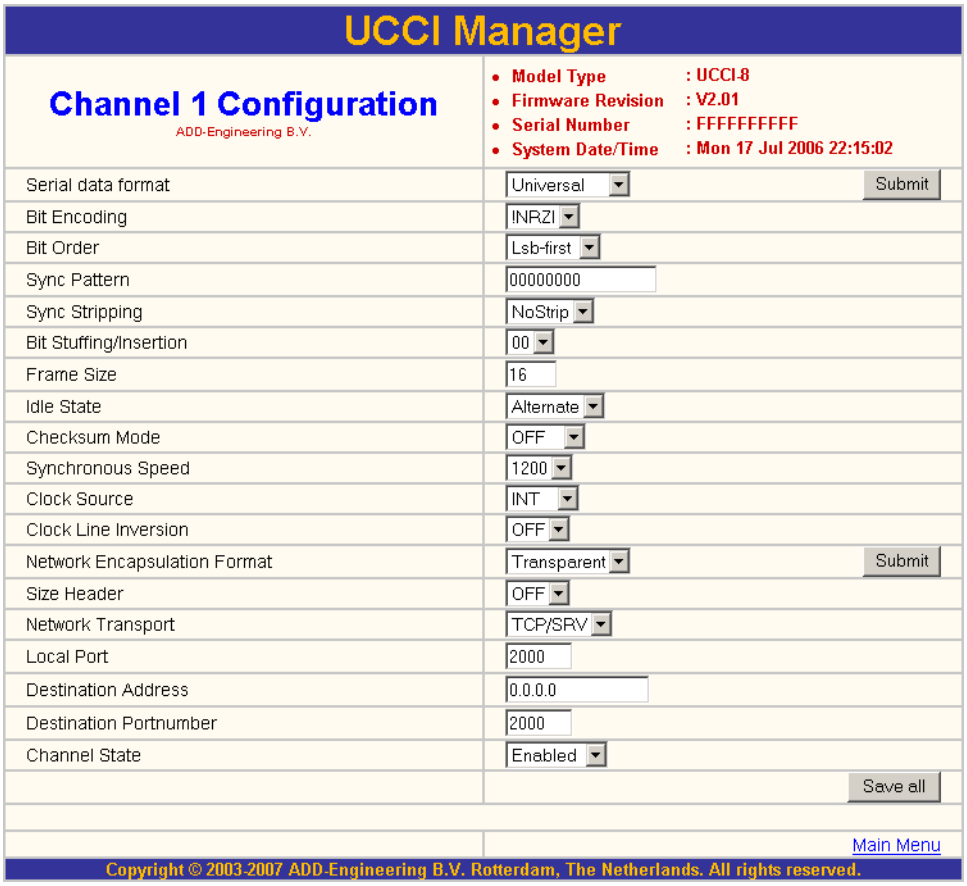
Web interface Channel Setup menu group

Channel Configuration

A channel can be configured by selecting the link for that specific channel in the Channel Setup menu group. There are 8 channel configuration links, thus one for each channel.

Please note that when a “Submit-button” is placed right from a menu item, it is required to click the “Submit-button” first before continuing with the channel configuration. After the “Submit-button” has been clicked the menu items that are not relevant to submitted the selection will be removed from the menu.

By clicking the “Save all-button”, all settings for the specific channel will be stored and the channel will be restarted.



Web interface Channel Configuration menu

Serial Data Format

Serial data format selects the type of “serial protocol” for that specific channel. **After selecting a specific channel type, the parameters that are of no use for the serial data format are hidden after clicking at the “Submit button” (at the right from the drop-down selection box).**

The UCCI currently provides 10 serial data formats, Link-1, Link-11B, ATDL, Universal, Transparent, HDLC, Link-1 K.A., SIMPLE, Async and LAPB.

- Link-1
  The serial data format that enables reception and transmission of Link-1 (STANAG-5501) frames. Link-1 data exchange through the network consists of 1 start-group, 14 data groups and 1 check group to add up to a frame of 16 bytes.
- Link-11B
  The serial data format that enables reception and transmission of Link-11B (STANAG-5511) frames. Link-11B data exchange through the network consists of 6 data-groups and 1 check-group to add up to a frame of 7 bytes.
- ATDL
  The serial data format that enables reception and transmission of ATDL (ATDL D1) frames.ATDL data exchange through the network consists of 7 data-groups and 1 check-group to add up to a frame of 8 bytes.
- Universal
  The flexible serial data format well known from the UCC that provides a wide range of configurable parameters to adapt the channel to a specific protocol.
- Transparent
  The serial data format well known from the UCC that provides a fully transparent interface to and from a synchronous serial communication line.
- HDLC
  The serial data format that enables the reception and transmission of HDLC frames (including CRC-verification and generation).
- Link-1 K.A.
  Like Link-1 but Link-1 K.A.sends S0.S0 test-frames at 10 second intervals as an indication to an (N)ADGE that the remote side (the UCCI) is still alive. The UCCI will also reply to S.14 acknowledge receipt messages as specified in STANAG-5501, APPENDIX 4 to ANNEX C. Link-1 K.A. data exchange through the network consists of 1 start-group, 14 data groups and 1 check group to add up to a frame of 16 bytes.
- SIMPLE
  The serial data format that enables the reception and transmission of SIMPLE frames (STANAG-5602). SIMPLE data exchange through the network consists of the complete SIMPLE frame received/transmitted on the serial communication line.
- Async
  The serial data format that provides a transparent interface to systems using asynchronous communication.
- LAPB

  Link Access Procedure Balanced, the serial data format that is built on top of HDLC to provide the capability to establish a link between two systems. Data between these systems will be exchanged in the form of INFO-frames.

Bit Encoding

Receiver

Bit-encoding for the receiver can be described as the way the line-state is decoded to a received bit. With the UCC it is possible to specify 4 different bit-encoding methods, NRZ, !NRZ, NRZI, !NRZI

- NRZ

  Generally known as Non Return to Zero, the line-state is directly decoded to form a bit. A logical ‘1’ on the physical line is "decoded" to a bit with the value ‘1’. A logical ‘0’ on the physical line is "decoded" to a bit with the value ‘0’.

- !NRZ

  Almost the same as NRZ but in this case all bits are simply inverted. A logical ‘1’ on the physical line is "decoded" to a bit with the value ‘0’ in memory. A logical ‘0’ on the physical line is "decoded" to a bit with the value ‘1’.

- NRZI

  Generally known as Non Return to Zero Inverted. Although the name implies that it is just the inverted version of NRZ, there is a more significant difference between these two. To decode the line-state to a bit in NRZI requires knowledge of the previous line-state. If there is a difference between the previous line-state and the actual line-state then it is decoded to a bit with the value ‘0’. If there is no difference between the previous and the actual line-state then it is decoded to a bit with the value ‘1’. In short, transitions will be decoded to form a bit with the value ‘0’ and steady states will be decoded to form a bit with the value ‘1’.

- !NRZI

  Almost the same as NRZI but in this case all bits are simply inverted. Transitions will be decoded to form a bit with the value ‘1’ and steady states will be decoded to form a bit with the value ‘0’.

Transmitter

Bit-encoding for the transmitter can be described as the way the bits which need to be transmitted are encoded to a line state.

- NRZ

Generally known as Non Return to Zero, the bit is directly encoded to form a line-state. A bit with the value ‘1’ is encoded to the physical line-state 1. A bit with the value ‘0’ is encoded to the physical line-state ‘0’.

- !NRZ

  Almost the same as NRZ but in this case all bits are simply inverted first. A bit with the value ‘1’ is encoded to the physical line-state ‘0’. A bit with the value ‘0’ is encoded to the physical line-state ‘1’.

- NRZI

  To encode the bit to transmit to a line-state in NRZI requires knowledge of the previous line-state. If a bit with the value ‘0’ needs to be encoded then the line-state should alter, so the actual line-state should be the inverted version of the previous line-state. If a bit with the value ‘1’ needs to be encoded the actual line-state should be the same as the previous line-state. In short, bits with the value ‘0’ will be encoded as transitions and bits with the value ‘1’ will be encoded as steady-states.

- !NRZI

  Almost the same as NRZI but in this case all bits are simply inverted first. In short, bits with the value ‘1’ will be encoded as transitions and bits with the value ‘0’ will be encoded as steady-states.

Bit Order

Receiver

For the receiver the bit-order can best be described as the order in which the synchronously/asynchronously received bits are submitted to the network. The most commonly used bit-order is LSB-first, however some applications require the opposite.

- LSB-FIRST

  The bit which is received first at the synchronous/asynchronous line will be placed at the LSB-position of the byte which will be submitted to the network. No bit-reversal is taking place.

- MSB-FIRST

  The bit which is received first at the synchronous/asynchronous line will be placed at the MSB-position of the byte which will be submitted to the network. In short it means that bit 0 becomes bit 7, bit 1 becomes bit 6 and so on.

Transmitter

For the transmitter the bit-order can best be described as the order in which the received bytes from the network are transmitted by the synchronous/asynchronous transmitter. The most commonly used bit-order is LSB-first, however some applications require the opposite.

- LSB-FIRST

  The bit at the LSB-position of the byte received from the network will be transmitted first by the synchronous/asynchronous transmitter. No bit-reversal is taking place.

- MSB-FIRST

  The bit at the MSB-position of the byte received from the network will be transmitted first by the synchronous/asynchronous transmitter. In short it means that bit 0 becomes bit 7, bit 1 becomes bit 6 and so on.

Sync Pattern

The Sync-Pattern can have a length in the range [5..16] bits. The Sync-Pattern is displayed in the web user interface with the MS-bit left and the LS-bit at the right. The Sync-Pattern is transmitted/received with the LS-bit first. Note that the way the Sync-Pattern is represented in the web user interface is different from the UCC and SyncMate.

Receiver

The Sync-Pattern specifies the sync-word on which the receiver will synchronise. The sync-pattern is compared after bit-decoding takes place. When the Sync-Pattern has been detected in the incoming data stream the device is considered to be in-sync.

Transmitter

The Sync-Pattern denotes the start of a frame. The pattern will be transmitted if there are bytes in the internal buffer. If there are less bytes in the buffer than the specified frame-length, the UCCI will transmit the bytes in the buffer and fill up the remaining bytes (which were possibly not submitted) with idle bits. The Sync-Pattern is fully user definable.

Strip Sync

To provide the user with the possibility to strip or not to strip the sync-word from the synchronously received data or to insert or not to insert the sync-word into the synchronously transmitted data, this option is implemented in the UCCI.

Receiver

- NOSTRIP

  The synchronously received sync-word is submitted to the user application through the network connection. In case the bit-order is reversed the sync-word will also be reversed.

- STRIP

  The number of synchronisation bits are stripped from the synchronously received data. In other words the sync-word is stripped from the data.

Transmitter

- NOSTRIP

  NOSTRIP in this context actually means no-insertion. No insertion of a sync-word takes place at the synchronous transmitter side. The user application has to submit the sync-word through the network connection.

- STRIP

  STRIP here means that the sync-word is inserted by the UCCI in case a new frame needs to be transmitted. The sync-word which is inserted is specified by the pattern "Sync-Pattern".

Frame-Length

The frame-length is selectable in the range of [1..254]. In general the Frame-Length is the number of bytes the user application will submit through the network connection or can expect from the network connection. The latter with some exceptions which can be read hereunder.

Receiver

With the Fame-Length parameter the number of bytes that the user aplication expects is specified. The number of bytes are submitted through the network connection. All the bytes which are received are included in the Frame-Length. So, in case the sync-word is not stripped the Sync-Word will count as part of the total Frame-Length.

Transmitter

With the Frame-Length parameter the number of bytes which the user application will submit through the network connection is specified. In case the Sync-Word is not stripped, the Sync-Word should be submitted by the user application through the network connection and thus will count as part of the Frame-Length. However, if a checksum-mode is selected, one byte less should be submitted while the UCCI is generating its own checksum to be forwarded with the data.

Bit Stuffing/Insertion

Specific bits are stripped from the data at the receiver's side and inserted at the transmitter's side.

Receiver

At the receiver's side (synchronous) the specified bit will be stripped from the data. The insert parameter in this menu is of no significance for the receiver's side. The bitposition parameter specifies which bit will be stripped after reception of the Sync-Word. Assuming the Sync-Word is found and the strip/insert parameter is set to bitposition ‘1’, insert ‘0’. Then the first bit after the Sync-Word is stripped from the data (in case Sync-Stripping is also enabled), then the next 8 bits are forwarded to the network connection and the next "first" bit is stripped from the data. This continues until all the bytes of the frame are received.

Transmitter

At the transmitter's side (synchronous) the specified bit will be inserted in the data. The insert parameter in this menu specifies if a ‘0’ or a ‘1’ will be inserted. Assuming the Sync-Word has already been transmitted (and sync-stripping is also enabled) and the strip/insert parameter is set to bitposition ‘1’, insert ‘0’. Then the first bit transmitted after the sync-word will be a ‘0’. After that a byte that is submitted through the network connection will be forwarded to the synchronous port and then another ‘0’ will be inserted. This continues until all the bytes of the frame are transmitted.

Idle-State

The Idle-State is used to specify the behaviour of the transmitter in the case that there are no bytes to transmit. The Idle-State is directly related to the line-state and thus no bit-encoding will take place. There are three possible idle-states, ‘0’, ‘1’ and ALT.

Receiver

This parameter is of no significance for the receiver.

Transmitter

- ‘0’

  Idle in zero's, invalid for NRZI and !NRZI bit encoding methods.

- ‘1’

  Idle in one's, invalid for NRZI and !NRZI bit encoding methods.

- ALT

  Idle in alternating states, normally this is used to keep receivers with DPLL in sync.

Checksum-Mode

Checksums can be generated by the UCCI, it means that the user does not have to calculate checksums over the data submitted to the UCCI. The checksum is transmitted as the last byte of a frame. The Checksum-Mode has three options, OFF, XOR and XNOR.

Receiver

The checksum-mode parameter is of no significance in the receiver.

Transmitter

The checksum calculated using the method defined above is attached to the frame as a last byte.

- OFF

  No checksum is attached to the frame

- XOR

  An XOR (exclusive or) will be performed over all the bytes in the frame (except the sync-word).

- XNOR

  An XNOR (inverted exclusive or) will be performed over all the bytes in the frame (except the sync-word).

Synchronous Speed

The Synchronous Speed parameter of the UCCI has only significance if INT (internal clock) or DPLL (digital phase locked loop clock) is enabled. In other cases the transmit/receive clock submitted will dictate the synchronous speed. Thus, when using external clock, the user is not limited by the selection of synchronous speeds down here.

- 300
  Data is clocked in and out at 300 bps.
- 600
  Data is clocked in and out at 600 bps.
- 1200
  Data is clocked in and out at 1200bps.
- 2400
  Data is clocked in and out at 2400bps.
- 4800
  Data is clocked in and out at 4800 bps.
- 9600
  Data is clocked in and out at 9600 bps.
- 19k2
  Data is clocked in and out at 19200 bps.
- 38k4
  Data is clocked in and out at 38400 bps.
- 64k
  Data is clocked in and out at 64000 bps.
- 128k
  Data is clocked in and out at 128000 bps.

Receiver

Data is clocked in at the selected speed.

Transmitter

Data is clocked out at the selected speed.

Clock-source

With the UCCI it is possible to select three different clock-domains. The first most commonly used is the external (EXT) clock-mode, the second is the internal (INT) clock-mode and the third and last is the digital pll (DPLL) clock-mode.

- INT
  The internal clock-mode is used when the UCCI should generate the clocking signals required. The synchronous clock-speed can be selected from the Synchronous-Speed menu. The clock which is generated internally is placed on pin 24 (ETCLK) of the DB25-male connector.
- DPLL
  The digital pll clock-mode is used when synchronous data is coming in at a known synchronous bit-rate but not accompanied by a clock signal. The synchronous clock-speed can be selected from the Synchronous-Speed menu. The clock which is generated internally is placed on pin 24 (ETCLK) of the DB25-male connector. The internally generated clock is synchronised continuously with the received data, or better with the transitions in this data.
- EXT
  With the external clock-mode clock-signals should be connected to the UCCI at pin 17 (RCLK) and pin 15 (TCLK) of the DB25-male connector. The RCLK is timebase related to the data on pin 3 (RxD) and the TCLK is timebase related to the data on pin 2 (TxD). The TCLK and RCLK need not to be related, however usually they are.

Receiver

Data is clocked in at the rate specified by the clock-signal.

Transmitter

Data is clocked out at the rate specified by the clock-signal.

Clock Line Inversion

The UCCI has the capability to invert the clock signals used for synchronous data communication. Inverting the clock signals could be a requirement when connecting to MIL-STD data communication equipment.

- OFF
  No inversion of the clock signals takes place. The unit operates with a clock polarity that is used with industry standard communication equipment. This means that data is clocked out at the rising edge of TxClk and data is clocked in at falling edge of RxClk (all at RS-232 level). Please note that the inversion operates different from the UCC where no clock inversion requires a '!'.
- ON
  Inversion of the clock signals takes place. The unit operates with a clock polarity that is used with military standard communication equipment. This means that data is clocked out at the falling edge of TxClk and data is clocked in at rising edge of RxClk (all at RS-232 level).See remark about UCC in 'OFF'.

Receiver

Data is clocked in at the appropiate edge.

Transmitter

Data is clocked out at the appropiate edge.

Data bits

Data bits only applies to protocols using an asynchronous communication port. Data bits defines the number of bits that comprise a character exchanged on the asynchronous communication line.

- DATA 8
  A character exchanged on the asynchronous communication line comprises 8 data bits.
- DATA 7
  A character exchanged on the asynchronous communication line comprises 7 data bits.
- DATA 6
  A character exchanged on the asynchronous communication line comprises 6 data bits.
- DATA 5
  A character exchanged on the asynchronous communication line comprises 5 data bits.

Stop bits

Stop bits only applies to protocols using an asynchronous communication port. Stop bits defines the number of bits that follow a character exchanged on the asynchronous communication line.

- STOP 1
  One stop bit will follow after each character exchanged.
- STOP 2
  Two stop bits will follow after each character exchanged.

Parity bit

Parity bit only applies to protocols using an asynchronous communication port. Parity bit defines the type of parity bit that follows an exchanged character on the asynchronous communication line.

- NONE
  No parity bit.
- MARK
  Parity bit is “mark”.
- SPACE
  Parity bit is “space”.
- ODD
  Parity bit is “odd”.
- EVEN
  Parity bit is “even”.

Flow control

Flow control only applies to protocols using an asynchronous communication port. Flow control (in this implementation) defines the hardware handshaking that takes place to indicate that data can be transmitted by the UCCI.

- NONE
  No flow control, the UCCI will send data regardless of the CTS signal state. The RTS will be actived when transmission takes place.
- RTSCTS
  The UCCI will activate RTS when the UCCI has data in the transmit buffer. The UCCI will transmit the data when an active CTS signal has been detected.

Async Speed

Async Speed only applies to protocols using an asynchronous communication port. Async Speed defines the at which speed the bit-elements of a character being clock in or out.

- 75
  Data is clocked in and out at 75 bps
- 110
  Data is clocked in and out at 110bps
- 300
  Data is clocked in and out at 300 bps
- 600
  Data is clocked in and out at 600 bps
- 1200
  Data is clocked in and out at 1200 bps
- 2400
  Data is clocked in and out at 2400 bps
- 4800
  Data is clocked in and out at 4800 bps
- 9600
  Data is clocked in and out at 9600 bps
- 19k2
  Data is clocked in and out at 19200 bps
- 38k4
  Data is clocked in and out at 38400 bps
- 115k2
  Data is clocked in and out at 115200 bps

Network Encapsulation Format

The UCCI has the capability to pack multiple frames received from the serial communication line into one packet and transmit the assembled packet on the network. Also, the UCCI has the capability to unpack a packet received from the network and forward the separate frames to the serial communication line. There is an infinite number of possibilities to encapsulate data, however the UCCI currently supports three network encapsulation formats, Transparent, ANFI and ANFI-MUX.

- TRANSPARENT
  Frames received from the serial communication line are forwarded transparently to the network communication channel. Except the possibility of a Size Header that can be prepended to the data, no encapsulation takes place. Frames received from the network channel will be forwarded transparently (except a possible Size Header) to the serial communication line.
- ANFI
  Frames received from the serial communication line are packed together to form a packet. The packet will be forwarded to the network communication channel. Packets received from the network communication channel will be disassembled and the separate frames will be forwarded to the serial communication line. See the appendices for further specification on the ANFI network encapsulation format.
- ANFI-MUX
  Frames received from the serial communication line are forwarded to the Multiplexer-channel of the UCCI to be combined with other channels using the Multiplexer capability. The packet will be forwarded to the network in the way that has been specified by the Multiplexer parameters. Packets received from the network communication channel of the Multiplexer will be disassembled into serial frames. In case the serial data format of a specific serial frame matches the addressed serial communication channel the serial data frame will be forwarded to the specified channel.

Buffering Time Out

Buffering time out can be used to specify the time the packed data (serial data frames packed in an ANFI-packet) is held in the buffer before being sent out to the network. In other words, everytime a serial data frame is received the timer is reset, when the timer reaches its threshold the data packed so far will be sent out to the network. A value of “0” means that there is no time out. The data will be sent out to the network when the complete ANFI-packet length reaches a size threshold of 1400 bytes.

Size Header

Size header is an option that is only used in the Transparent network encapsulation format to place the size of the frame in front of the frame itself.

- OFF
  No size header is placed (or expected) in front of the data transmitted/received through the network communication channel.
- ON
  A size header is placed (or should be placed in case of the user application) in front of the data being sent through the network communication channel. The size header is a two byte value (actually 16 bits unsigned) with the LS-Byte being sent first. The maximum size of a frame sent through the transparent network encapsulation format with Size Header “ON” thus is 65535.

Network Transport

The UCCI supports three different ways of exchanging data through the TCP/IP based Ethernet network. UDP, TCP/CLT and TCP/SRV.

- UDP
  User Datagram Protocol, this means of transport is not connection oriented, there is no guarantee that a datagram sent out on the network will reach is destination. Nor is there any means of flow control. However, in case multiple systems would require to listen to the same data it could be efficient to broadcast the data through UDP.
- TCP/CLT
  Transmission Control Protocol-Client, this means of transport is connection oriented which means that a connection should be established between local and remote system before exchange of data can take place. The client part in this terminology means that the UCCI will actively set up the connection to the remote side (server).
- TCP/SRV
  Transmission Control Protocol-Server, this means of transport is connection oriented which means that a connection should be established between local and remote system before exchange of data can take place. The server part in this terminology means that the UCCI will passively wait for any incoming connections from a remote system (client).

Local Port

The local port has only significance for UDP and TCP-server network transport mechanisms. It defines which port receives the data when using UDP as a network transport mechanism and it defines the port that accepts incoming connections from remote clients when using TCP-server as a network transport mechanism. Recommended range [1024..65535].

Destination Address

The destination address has only significance for UDP and TCP-client network transport mechanisms. It defines the address to which the datagram will be sent when using UDP as a network transport mechanism and it defines the remote server address to which the UCCI should connect to when using the TCP-client network transport mechanism.

Destination port

The destination port has only significance for UDP and TCP-client network transport mechanisms. It defines the “end-port” of the destination address to which datagrams will be sent when using UDP as a network transport mechanism and it defines the port at which the remote server is listening (and normally thus accepting connections) and the UCCI should connect to when using the TCP-client network transport mechanism.

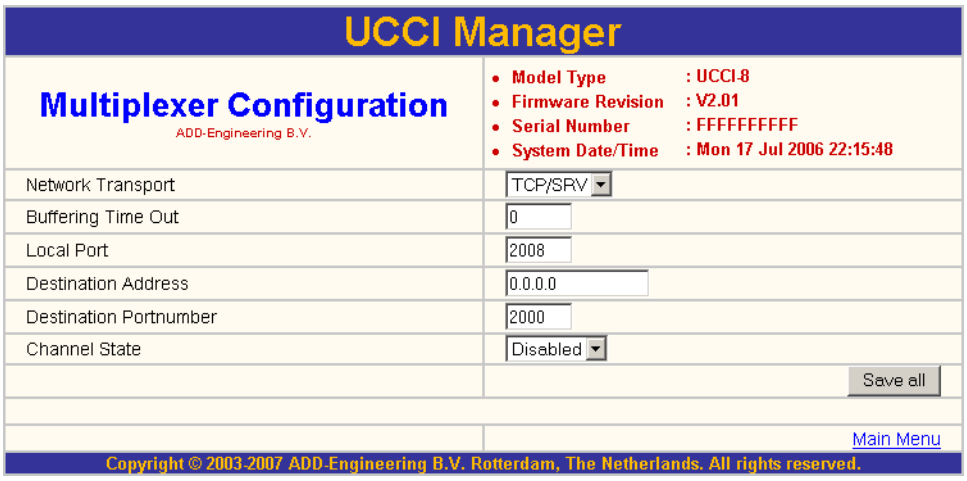
Channel State

Channel state provides the option to enable or disable the specific communication channel on the UCCI.

- ENABLED
  The channel is enabled, operational.
- DISABLED
  The channel is disabled.

Multiplexer

The UCCI has a multiplexing/demultiplexing capability that enables the exchange data from multiple serial channels through one single TCP/IP channel. An application for this capability could be to connect two UCCI's back-to-back (with respect to the network side) and in this way extend the distance between two systems to infinite for a maximum of 8 serial channels.



Web interface Multiplexer Configuration menu

Network Transport

The Multiplexer supports three different ways of exchanging data through the TCP/IP based Ethernet network. UDP, TCP/CLT and TCP/SRV.

- UDP
  User Datagram Protocol, this means of transport is not connection oriented, there is no guarantee that a datagram sent out on the network will reach is destination. Nor is there any means of flow control. However, in case multiple systems would require to listen to the same data it could be efficient to broadcast the data through UDP.
- TCP/CLT
  Transmission Control Protocol-Client, this means of transport is connection oriented which means that a connection should be established between local and

remote system before exchange of data can take place. The client part in this terminology means that the UCCI will actively set up the connection to the remote side (server).

- TCP/SRV
  Transmission Control Protocol-Server, this means of transport is connection oriented which means that a connection should be established between local and remote system before exchange of data can take place. The server part in this terminology means that the UCCI will passively wait for any incoming connections from a remote system (client).

Buffering Time Out

Buffering time out can be used to specify the time the packed data (serial data frames packed in an ANFI-packet) is held in the buffer before being sent out to the network. In other words, everytime a serial data frame is received the timer is reset, when the timer reaches its threshold the data packed so far will be sent out to the network. A value of “0” means that there is no time out. The data will be sent out to the network when the complete ANFI-packet length reaches a size threshold of 1400 bytes.

Local Port

The local port has only significance for UDP and TCP-server network transport mechanisms. It defines which port receives the data when using UDP as a network transport mechanism and it defines the port that accepts incoming connections from remote clients when using TCP-server as a network transport mechanism. Recommended range [1024..65535].

Destination Address

The destination address has only significance for UDP and TCP-client network transport mechanisms. It defines the address to which the datagram will be sent when using UDP as a network transport mechanism and it defines the remote server address to which the UCCI should connect to when using the TCP-client network transport mechanism.

Destination Portnumber

The destination port number has only significance for UDP and TCP-client network transport mechanisms. It defines the “end-port” of the destination address to which datagrams will be sent when using UDP as a network transport mechanism and it defines the port at which the remote server is listening (and normally thus accepting connections) and the UCCI should connect to when using the TCP-client network transport mechanism.

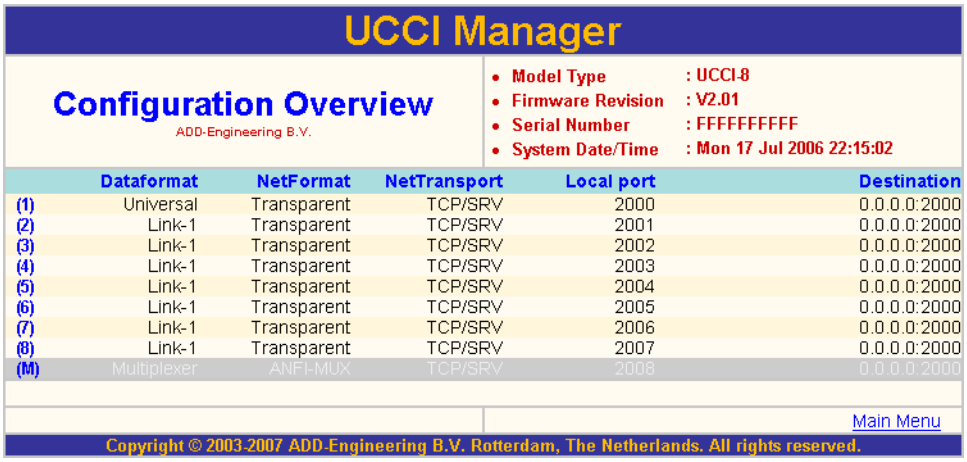
Channel State

Channel state provides the option to enable or disable the multiplexer on the UCCI.

- ENABLED
  The multiplexer is enabled, operational.
- DISABLED
  The multiplexer is disabled.

Overview

The Configuration Overview shows a summary of the channel configurations for all of the UCCI's channels. The heading above each column from the table is self explanatory (see Channel Configuration for details). Disabled channels are identified by a greyed-out row in the table.



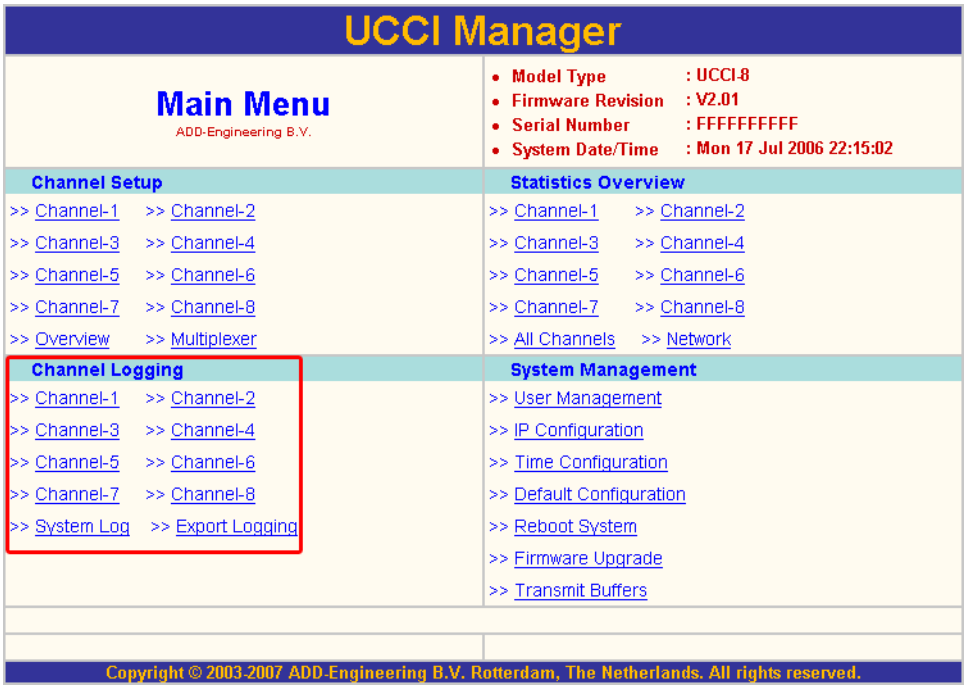
Web interface Configuration Overview menu

Chapter 5
Channel Logging

The Channel Logging menu group allows the user to configure the logging options available in the UCCI. The UCCI has serial a data logging facility for each of the serial communication channels, a global system logging and the capability of exporting the log messages to an external system.

The logging capabilities in the UCCI are included as a means for fault finding when connecting the UCCI to external systems. For reason of performance it is not recommended to use the serial data capability continuously. For this reason the serial data logging is disabled each time a channel is (re)started. The latter thus means that the serial data logging configuration is not stored permanently in any configuration setting.

All of the logging takes place in RAM, therefore all of the logging is volatile. Powering off the unit will delete all the log messages from the memory. The UCCI has a capacity to hold 10000 log records in memory in a sort of circular buffer fashion. When the last log record (10000) has been written the next written log record will overwrite the first log record (1). The maximum number of log records displayed on a log page is limited to 1000 (to avoid long downloading times when requesting a log page).



Web interface Channel Logging menu group

Channel Logging

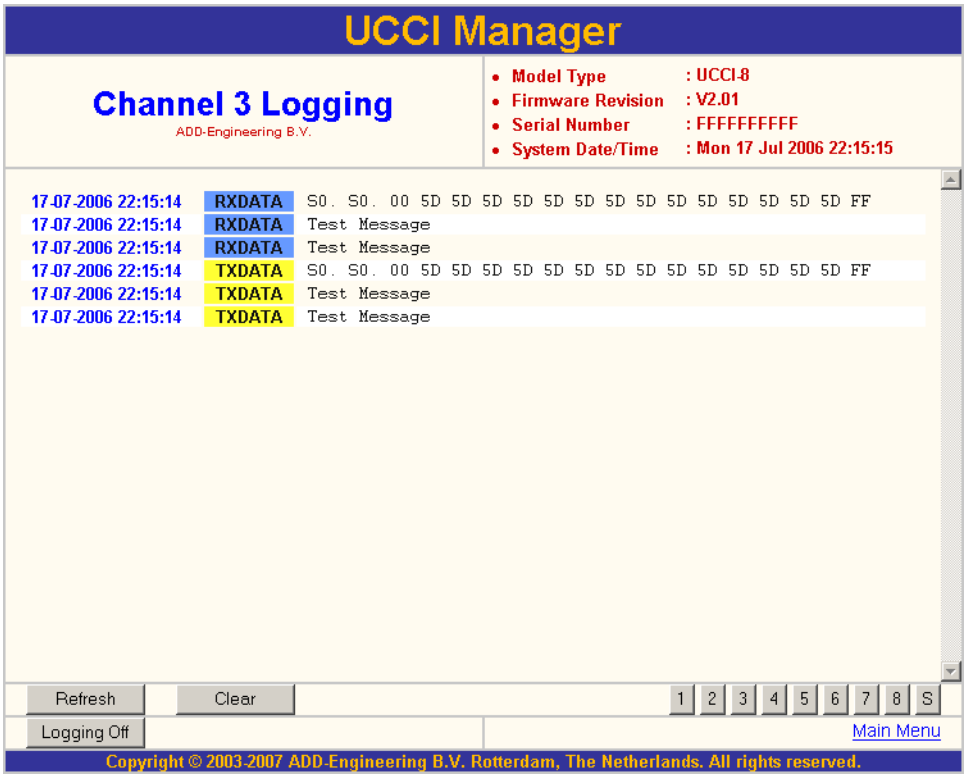
Channel logging provides the capability to log data received and/or transmitted on the serial line. For protocols like Link-1 and Link-11B a textual interpretation of the data is displayed as well as the data itself. For protocols like HDLC, SIMPLE and LAPB only a textual interpretation will be displayed. For serial data formats like Transparent, Universal and Async only the data will be displayed.

By clicking the "Logging On-button", the logging is for the specific channels is enabled (and the "Logging On-button" changes into "Logging Off". Clicking the "Logging Off-button" disables the logging.

Clicking the "Refresh-button" will cause the browser to refresh the content of the page and will cause the page to reflect the most recent log contents.

Clicking the "Clear-button" will delete all the RXDATA/TXDATA log entries for the specific channel from the log buffer.

On the bottom right side of the screen there are a number of buttons labeled "1","2","3","4","5","6","7","8","S". These are shortcuts to jump from one channel logging to another. The "S" is to jump to the system logging.



Web interface Channel Logging menu

RX Data

The RXDATA displays the data received on the serial communication line and/or a textual interpretation of the data.

TX Data

The TXDATA displays the data transmitted on the serial communication line and/or the textual interpretation of the data.

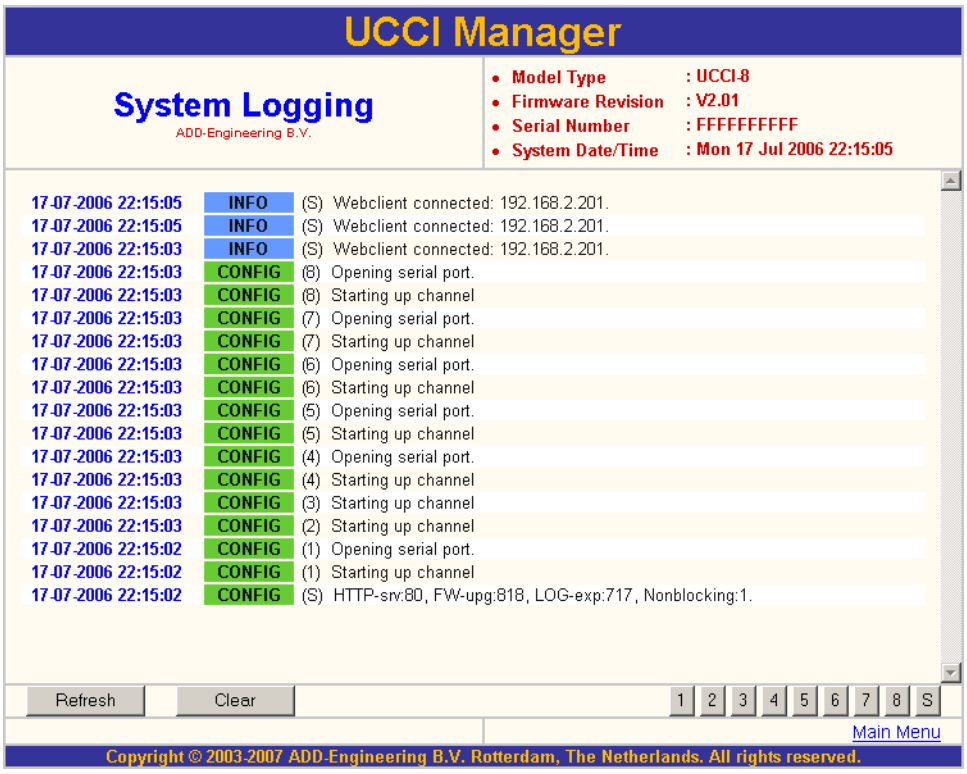
System Log

System logging provides a view on the events taking place in the UCCI. There are several levels of severity, in order of increasing severity these are "DEBUG","INFO","CONFIG","WARNING" and "ERROR". Before the message of each log record the number (1..8) or character (M, S) identifies the origin of the log record. Where the numbers identify the channels, the "M" identifies the Multiplexer and the "S" identifies the System.

Clicking the "Refresh-button" will cause the browser to refresh the content of the page and will cause the page to reflect the most recent log contents.

Clicking the "Clear-button" will delete all the log entries displayed from the log buffer.

On the bottom right side of the screen there are a number of buttons labeled "1","2","3","4","5","6","7","8","S". These are shortcuts to jump from one channel logging to another. The "1" is to jump to the logging of channel 1.

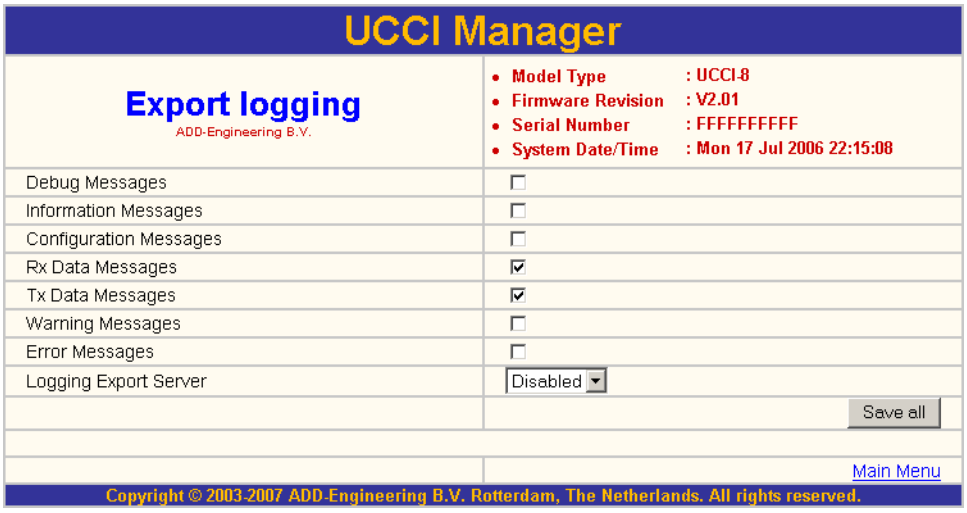


Web interface System logging menu

Export Logging

Export Logging facilitates storage of log messages on an external system. By connecting to the export log service port (port number 717), log messages (serial received/transmitted data) in textual format can be received from the UCCI. The log messages are formatted in pretty much the same fashion as represented in the web user interface. The UCCI provides users the ability to select specific severity levels through the configurable log filter. For instance, by selecting Rx Data Messages and Tx Data Messages only the serial data received and transmitted on the serial ports is exported through the export log service port. As an example one could use "telnet" to connect to the export log service port (eg. telnet 192.168.0.100 717). Please note that when the export log is not able to write to the client (for instance because of flow control at TCP/IP level as a result of buffers that fill up), the connection is closed automatically.

Clicking on the "Save all-button" configures and restarts the export log server.



Web interface Export logging menu

Debug Messages

Checking this box (at the right side) enables export of log messages with the "DEBUG" severity level

Information Messages

Checking this box (at the right side) enables export of log messages with the "INFORMATION" severity level

Configuration Messages

Checking this box (at the right side) enables export of log messages with the "CONFIGURATION" severity level

Rx Data Messages

Checking this box (at the right side) enables export of log messages with the "RXDATA" severity level

Tx Data Messages

Checking this box (at the right side) enables export of log messages with the "TXDATA" severity level

Warning Messages

Checking this box (at the right side) enables export of log messages with the "WARNING" severity level

Error Messages

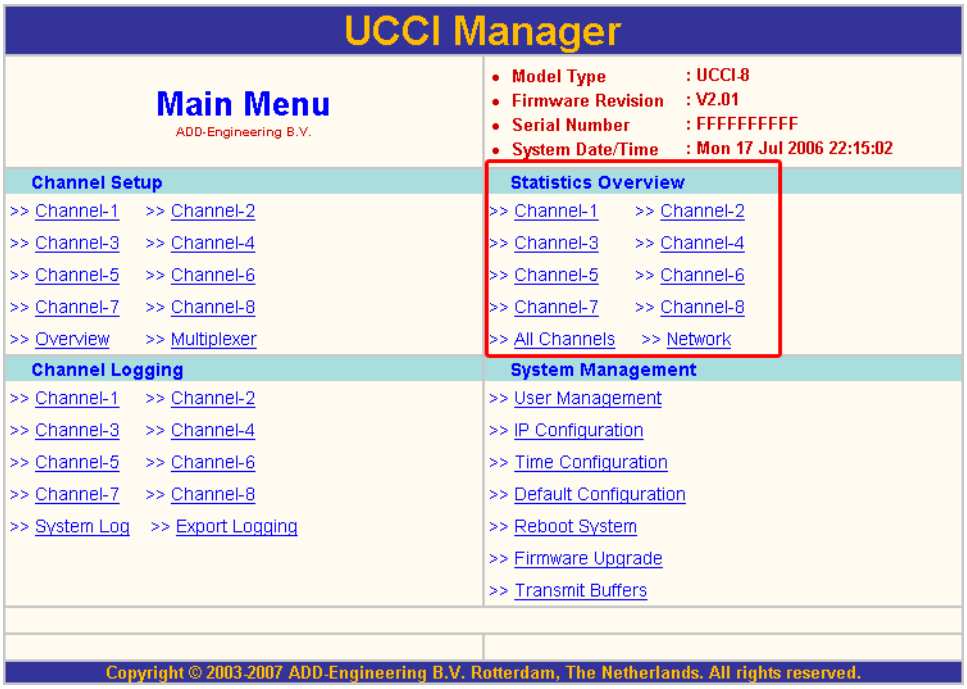
Checking this box (at the right side) enables export of log messages with the "ERROR" severity level

Logging Export Server

- ENABLED
  The logging export server is enabled. Clients can connect to the TCP/IP service port.
- DISABLED
  The logging export server is disabled. Clients already connected to the TCP/IP service port will be disconnected.

Chapter 6
Statistics Overview

The Statistics Overview menu group provides the user a number of views on the UCCI's statistics. The UCCI provides per channel statistics, a global overview on the serial and network statistics for all channels and a global overview on the channel's network bandwidth usage and network connection state (when applicable).



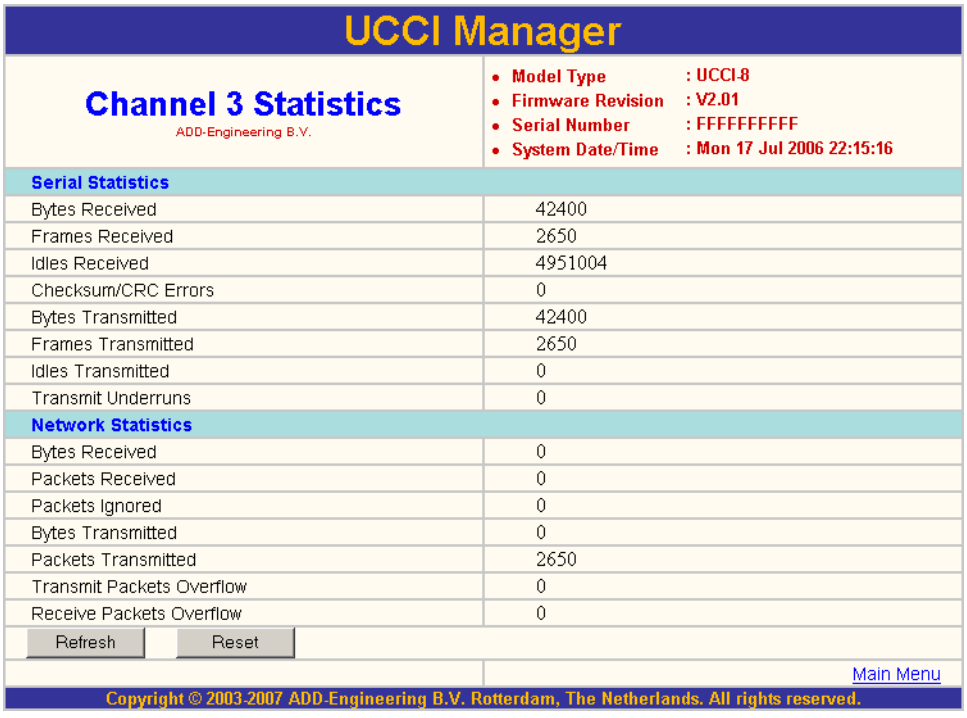
Web interface Statistics Overview menu group

Channel Statistics

The Channel Statistics provide a detailed overview of the statistics per channel. The Channel Statistics page is automatically refreshed to represent the most recent statistics. The Channel Statistics are divided into two area's, serial statistics and network statistics.

Clicking the "Refresh-button" will cause the content of the page to be refreshed.

Clicking the "Reset-button" will cause set all the statistics displayed on the page to 0.



UCCI Manager

Channel 3 Statistics

ADD-Engineering B.V.

- Model Type : UCCI-8
- Firmware Revision : V2.01
- Serial Number : FFFFFFFFFF
- System Date/Time : Mon 17 Jul 2006 22:15:16

Serial Statistics	
Bytes Received	42400
Frames Received	2650
Idles Received	4951004
Checksum/CRC Errors	0
Bytes Transmitted	42400
Frames Transmitted	2650
Idles Transmitted	0
Transmit Underruns	0
Network Statistics	
Bytes Received	0
Packets Received	0
Packets Ignored	0
Bytes Transmitted	0
Packets Transmitted	2650
Transmit Packets Overflow	0
Receive Packets Overflow	0

Refresh Reset

Main Menu

Web interface Channel Statistics menu

Bytes Received

Displays the number of bytes received through the serial communication line.

Frames Received

Displays the number of frames received through the serial communication line.

Idles Received

Displays the number of idles (in bytes) received from the serial communication line.

Checksum/CRC-Errors

Displays the number of checksum errors or CRC-errors (HDLC/LAPB).

Bytes Transmitted

Displays the number of bytes transmitted on the serial communication line.

Frames Transmitted

Displays the number of frames transmitted on the serial communication line.

Idles Transmitted

Remains 0.

Transmit Underruns

Remains 0.

Bytes Received [network]

Displays the number of bytes received from the network for the specific channel.

Packets Received [network]

Displays the number of packets received from the network for the specific channel.

Packets Ignored [network]

Displays the number of packets that did not pass the network encapsulation validation criteria.

Bytes Transmitted [network]

Displays the number of bytes transmitted to the network for the specific channel.

Packets Transmitted [network]

Displays the number of packets transmitted to the network for the specific channel.

Transmit Packets Overflow [network]

Displays the number of packets that are discarded because transmission to the destination was not possible (for instance because of congestion).

Receive Packets Overflow [network]

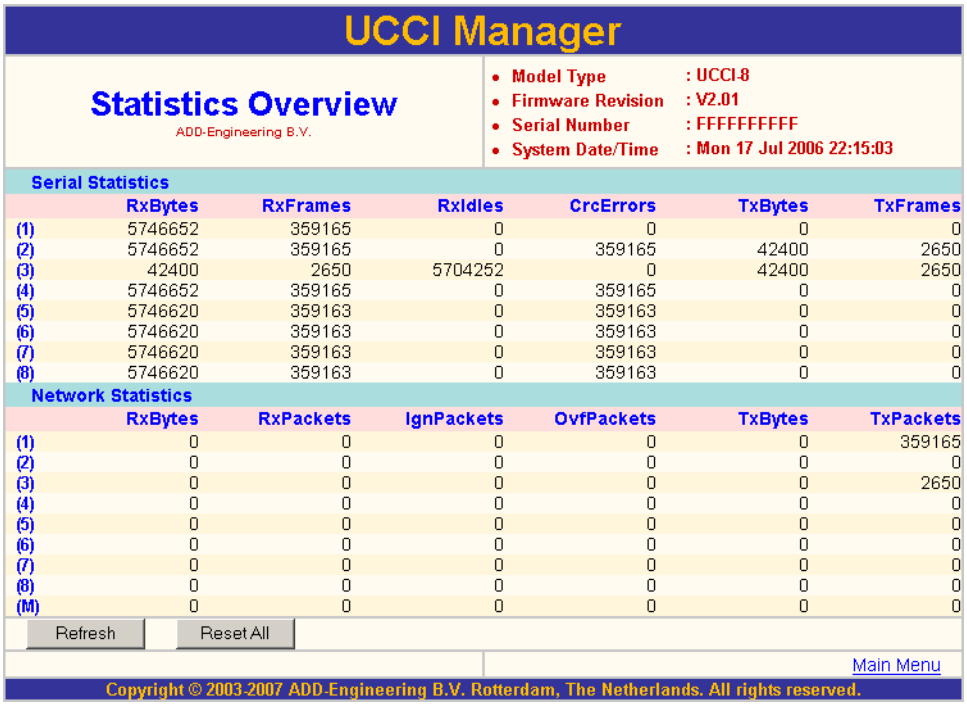
Remains 0.

All Channels

The Statistics Overview provides a detailed overview of the statistics of all channels. The Channel Statistics page is automatically refreshed to represent the most recent statistics. The Statistics Overview is divided into two area's, serial statistics and network statistics.

Clicking the "Refresh-button" will cause the content of the page to be refreshed.

Clicking the "Reset-button" will cause set all the statistics displayed on the page to 0.



UCCI Manager

Statistics Overview

ADD-Engineering B.V.

- Model Type : UCCI-8
- Firmware Revision : V2.01
- Serial Number : FFFFFFFFFF
- System Date/Time : Mon 17 Jul 2006 22:15:03

Serial Statistics

	RxBytes	RxFrames	RxIdles	CrcErrors	TxBytes	TxFrames
(1)	5746652	359165	0	0	0	0
(2)	5746652	359165	0	359165	42400	2650
(3)	42400	2650	5704252	0	42400	2650
(4)	5746652	359165	0	359165	0	0
(5)	5746620	359163	0	359163	0	0
(6)	5746620	359163	0	359163	0	0
(7)	5746620	359163	0	359163	0	0
(8)	5746620	359163	0	359163	0	0

Network Statistics

	RxBytes	RxPackets	IgnPackets	OvfPackets	TxBytes	TxPackets
(1)	0	0	0	0	0	359165
(2)	0	0	0	0	0	0
(3)	0	0	0	0	0	2650
(4)	0	0	0	0	0	0
(5)	0	0	0	0	0	0
(6)	0	0	0	0	0	0
(7)	0	0	0	0	0	0
(8)	0	0	0	0	0	0
(M)	0	0	0	0	0	0

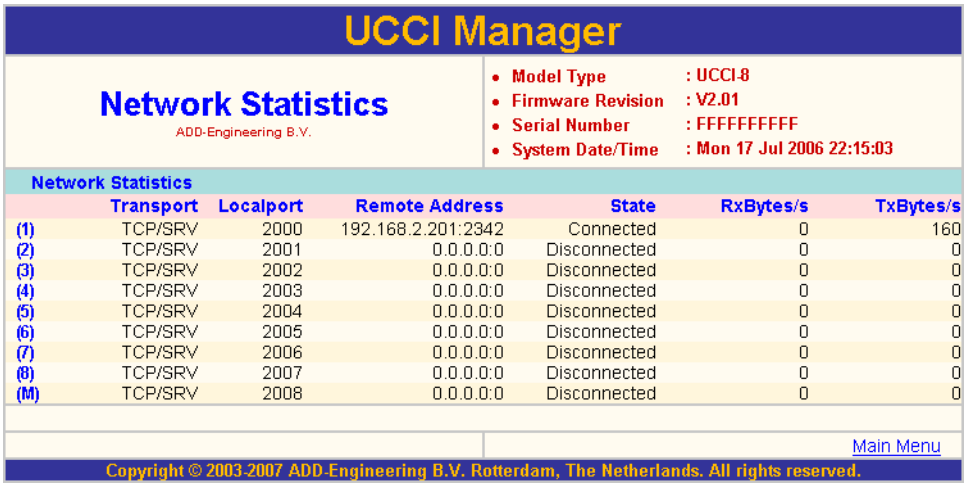
Refresh Reset All

Main Menu

Web interface Statistics overview menu

Network

The Network Statistics provides a detailed overview of the network statistics/performance of all channels. The Network Statistics page is automatically refreshed to represent the most recent statistics.



Web interface Network statistics menu

Transport

Displays the network transport mechanism that has been selected for the specific channel. The possible transport mechanisms are TCP/SRV, TCP/CLT and UDP.

Localport

Displays the local port number used to exchange data across the network.

Remote Address

Displays the address of the remote side (if applicable) in the format IP-address:portnumber

State

Displays the state of the network connection for the specific channel. Possible states are "Trying connect", "Connected", "Disconnected" and "-".

RxBytes/s

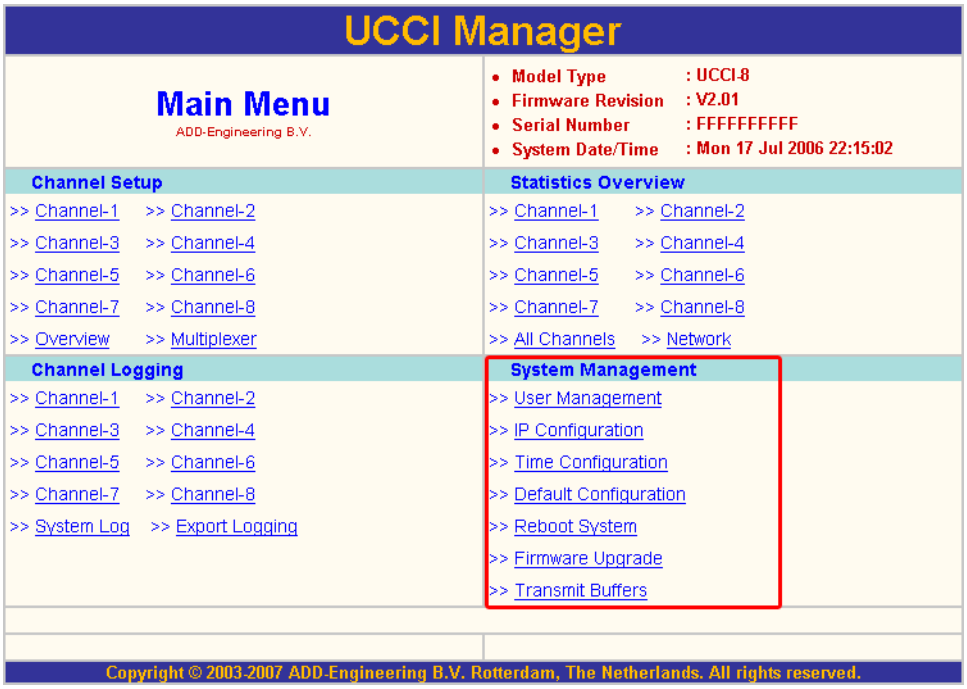
Represents the number of bytes received per second calculated over a 2 second interval.

TxBytes/s

Represents the number of bytes transmitted per second calculated over a 2 second interval.

Chapter 7
System Management

The System Management menu group provides access to a number of UCCI-wide management facilities like network configuration, user management, time configuration, firmware upgrade and monitoring the state of the serial transmit buffers and Clear To Send status lines.

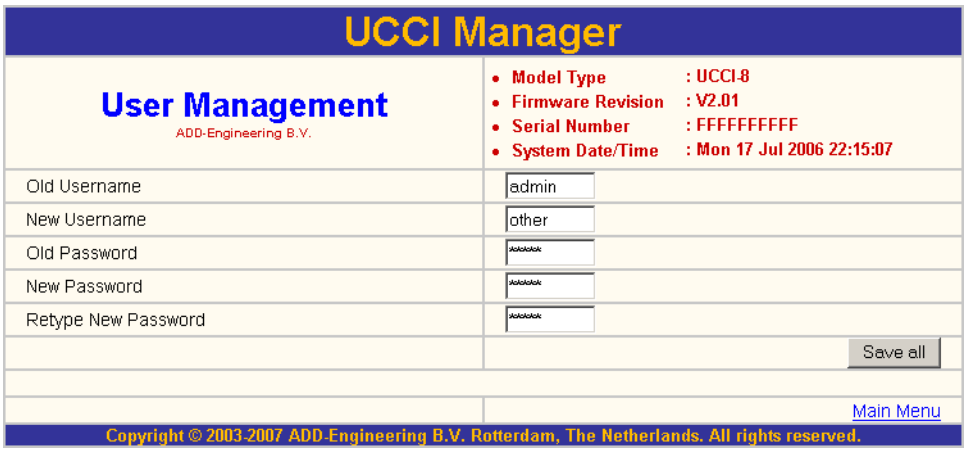


Web interface System Management menu group

User Management

The User Management menu enables users to customize the username and password combination for the UCCI required to logon to the unit. The UCCI only stores one set of credentials, thus only one username and password combination provides access to the unit.

Clicking the "Save all-button" will cause the username and password combination to change to the requested values in case the new values comply to username and password rules.



Web interfaceUser Management menu

Old Username

The current username should be typed in this text box.

New Username

The new username should be typed in this text box.

Old Password

The current password should be typed in this text box.

New Password

The new password should be typed in this text box.

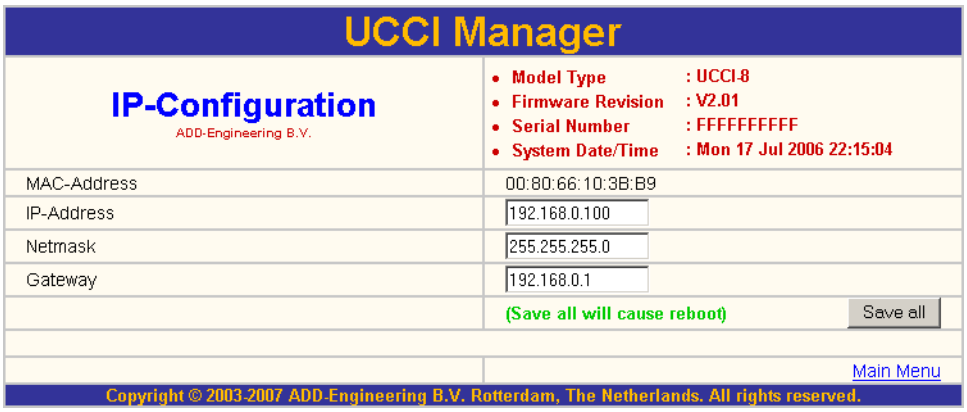
Retype New Password

The new password should be re-typed in this text box.

IP-Configuration

The IP-Configuration menu enables users to configure the IP-address for network interface 1 of the UCCI (network interface 2 has an unchangeable IP-address 192.168.1.100). The menu also allows configuration of a default gateway.

Clicking the "Save all-button" will cause the settings to be validated and stored in the UCCI. The UCCI will automatically reboot and startup with these new settings.



Web interface IP-Configuration menu

MAC Address

Shows the hardware Ethernet address of network interface 1.

IP-Address

Shows the currently configured IP-address for network interface 1 of the UCCI and allows modifications of the address.

Netmask

Shows the currently configured network mask configuration for network interface 1 of the UCCI and allows modifications of the network mask.

Gateway

Shows the currently configured default gateway configuration for network interface 1 of the UCCI and allows modification of the default gateway.

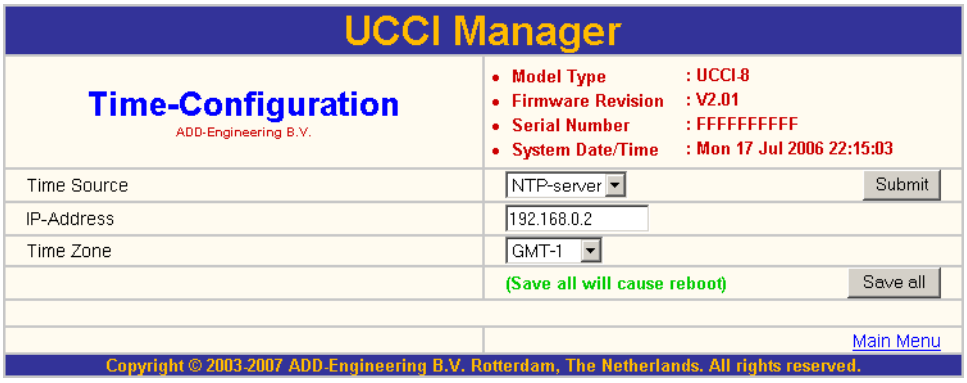
Time Configuration

The UCCI has an internal system clock that has the capability to synchronize itself to a network time source (through the Network Time Protocol) or synchronize itself to the client's web browser time.

A synchronized internal system clock could be beneficial when the ANFI network encapsulation format is used to packetize serial data. Every new ANFI packet includes an absolute time stamp with milliseconds accuracy. Every frame received through the serial communication line is prepended by an offset from this absolute time.

Master clock synchronized time stamping of received data is extremely important for external systems that perform track-to-track or plot-to-track correlation.

Clicking the "Save all-button" will cause the configuration to be stored. After storing the configuration the UCCI will be restarted to prevent missing events caused by a discontinuity in the time.



Web interface Time-Configuration menu

Time Source

- NTP-Server
  Selects an NTP-Server as a time source.
- Browser
  Selects the client's browser as the time source (and implicitly the client's host system)

IP-Address

The IP-Address of the NTP-server.

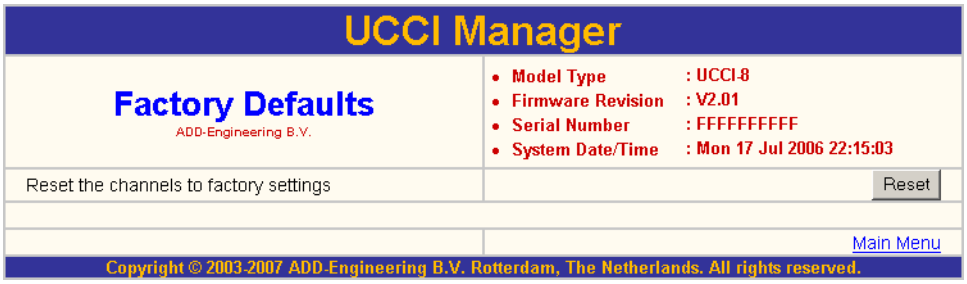
Time Zone

The offset GMT-offset from your time zone. **Please note that the UCCI uses the POSIX standard for time zones. The POSIX standard has positive signs for time zones west of Greenwich, while east of Greenwich the time zones have negative signs. This could be exactly the opposite of what you would expect.** The time zone for Amsterdam is GMT-1.

Default Configuration

The Factory Defaults menu enables users to revert the **channel configurations** to default.

Clicking the "Reset-button" will cause all the channels to be configured to the factory defaults. All channels will be restarted automatically with the default configuration.



Web interface Factory Defaults menu

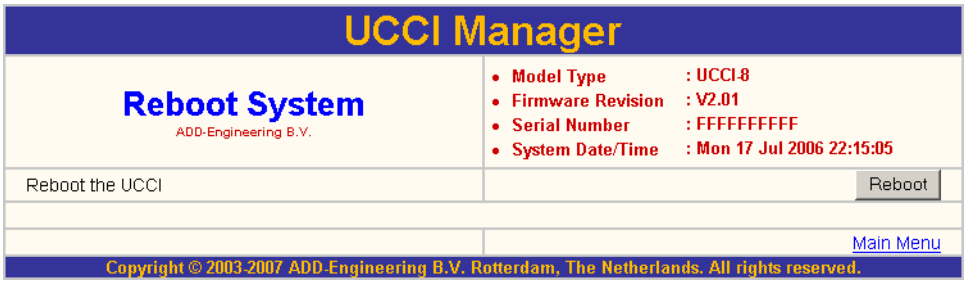
Parameter	Value
Serial data format	Link-1
Bit Encoding	!NRZI
Synchronous Speed	1200
Clock Source	INT
Clock Line Inversion	OFF
Network Encapsulation Format	Transparent
Size Header	OFF
Network Transport	TCP/SRV
Local Port	1999 + Channel number
Destination Address	0.0.0.0
Destination Port	2000
Channel State	Enabled

Default channel configuration

Reboot System

The Reboot System menu provides an easy way to reboot the system from a remote location.

Clicking the "Reboot-button" will cause the UCCI to reboot.

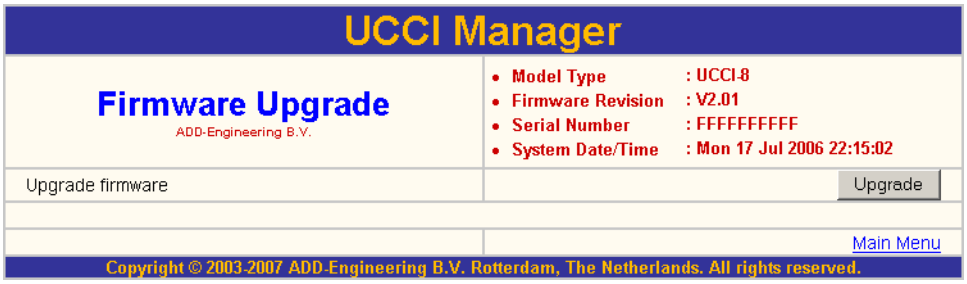


Web interface Reboot System menu

Firmware Upgrade

The Firmware Upgrade menu provides an easy means of upgrading the firmware of the UCCI. When an upgrade is available for the standard UCCI, this firmware will be offered for download, free of charge, on ADD-Engineering's website http://www.add.nl.

Clicking the "Upgrade-button" will activate the upgrade service in the UCCI.



Web interface Firmware Upgrade menu

Activating the upgrade service in the UCCI will cause the upgrade port (818) to listen to incoming connections. When the upgrade has not been initiated from the host within 60 seconds from activating the upgrade mode, the upgrade port will be closed and the firmware upgrade service is deactivated. Upgrading of the UCCI can be performed using the netcat/nc command that is popular in the Linux environment. Typically the upgrade command for an UCCI with network address would be:

cat firmware.bin | nc 192.168.0.100 818

After the firmware has been uploaded (which can be checked through the system log) the UCCI needs to be rebooted to process the uploaded file. After processing the uploaded file during the startup process, the UCCI will start up as usual. Please take note on the top right part of the user interface that the version number displayed is indeed the version you would expect from the upgrade.

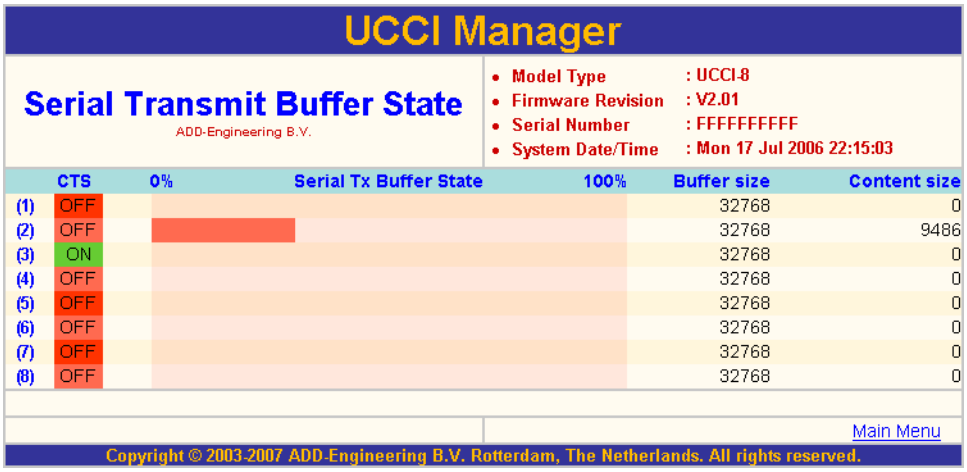
Transmit Buffers

The Serial Transmit Buffer State provides users with the capability to verify the status of the Clear To Send signal lines of the UCCI.

The Clear To Send signal lines provide a handshake to the UCCI that the unit is allowed to send data on the specific serial communication channel. When this signal line is "OFF", the UCCI can not send any data on the specific serial communication channel (and the data will be buffered).

In case the signal line is not used it is mandatory to connect the RTS signal line (pin 5 at the DB25-male connector of the UCCI) to the CTS signal line (pin 4 at the DB25-male connector of the UCCI).

The page is refreshed automatically every 10 seconds.



Web interface Serial Transmit Buffer State menu

Text version

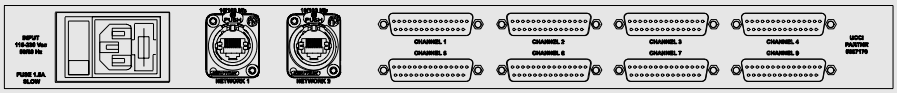
The UCCI also has a very simple text-version of the Serial Transmit Buffer State page which can be found at: http://192.168.0.100/txbufstate.txt. The output of this page will look like:

1;0;0;2;0;0;3;1;0;4;0;0;5;0;0;6;0;0;7;0;0;8;0;0;

where the first number indicates the channel number, the second number indicates the status of the CTS signal line (0=OFF, 1=ON) and the third number indicates the number of bytes currently available in the transmit buffer.

Chapter 8
Connecting the UCCI

The back-panel of the Universal Communication Controller Improved has a large number of connectors. There are male (plug) DB25 connectors, RJ-45 connectors and a IEC/EURO style power inlet connector. The male (plug) connectors represent the DTE (Data Terminal Equipment) function of the channels. The two RJ-45 connectors represent the network ports used to connect the UCCI to an Ethernet switch or router. A description of these connectors together with the power-inlet connector is provided in this chapter.



Back-panel of the UCCI

Power

The power to the UCCI is delivered through a IEC/EURO style power inlet. Operating voltage can be in the range 115-230V, 50-60Hz.

DTE Ports

The DTE-ports are the male DB25 connectors. The ports are called DTE-ports because the pinning is exactly as on a DTE device. These are the ports that in most configurations interface to a modem (DCE-device). Pinouts of the DTE-ports can be found in the appendices.

Note

For correct operation of the UCCI, it is of major concern that the CTS signal inputs on the DTE-ports (pin 5) have a defined value which indicates Clear To Send, either CTS is tied to RTS (pin 4) directly or CTS is tied to the CTS output of the modem. In case the CTS signal is not asserted, the unit will not be able to send any data.

Network Ports

The UCCI has two network ports marked network-1 and network-2. The network-1 interface has an IP-address that is user configurable. The network-2 interface has an IP-address that is fixed at 192.168.1.100. In case the user selected IP-address is unknown it is possible to connect to the network-2 interface and reconfigure the IP-settings for the network-1 interface.

Appendix A
Warranty and Maintenance

Warranty Information

Hardware

All ADD-Engineering B.V.'s hardware products are covered by a one year warranty from the original date of purchase. Warranty coverage includes:

Telephone support. Free phone support on any hardware product for one year after initial product purchase. ADD-Engineering's Customer Service and Support (CSS) hours are 9:00 am to 5:00 pm, Monday through Friday.

Rapid replacement. Upon CSS phone verification of hardware failure within the first 90 days after purchase, ADD-Engineering will issue a return material authorization (RMA) number for rapid replacement. If the failed unit is in stock, a replacement unit will be shipped within one business day. If the failed unit is not in stock, it will receive the highest priority for repair once ADD-Engineering receives the unit.

Extended maintenance option. Extends the standard warranty coverage, including rapid replacement, to a maximum of three years when purchased within 30 days of initial product purchase. The extended maintenance period starts at the date of purchase.

Out of warranty repair service is available for a per-product flat fee. Typical turnaround for out-of-warranty repairs is four to six weeks from date of factory receipt.

Limited Hardware Warranty. ADD-Engineering warrants its hardware products to be free from defect in materials and workmanship. ADD-Engineering will repair or replace (at its option) all defective product returned freight pre-paid, in original packaging, to its factory in Rotterdam, The Netherlands within one (1) year. ADD-Engineering reserves the right to ship replacement units from our inventory of reconditioned units. All other warranties, expressed or implied, are limited to the restrictions of this warranty. Product abuse, alteration, or misuse invalidates all warranties. This warranty does not cover damages incurred by natural or electrical forces exceeding the stated product specifications. In no event will ADD-Engineering's warranty liability exceed the purchase price of the product. No liability is assumed for any consequential damages resulting from the use of any ADD-Engineering product.

This warranty is in lieu of all other warranties, including but not limited to the warranties of merchantability and fitness for a particular purpose. National, state and local laws may offer rights in addition to those stated above.

Product Information Worksheet

Please record the following information about your Universal Communication Controller Improved.

UCCI Serial number:

Purchase date:

Appendix B
Cables and Connectors

This appendix provides necessary background information for making connections to the serial ports on the UCCI. It discusses the standard RS-232 pinouts, and describes some typical cables

Two terms used frequently throughout this appendix are

- Data Communication Equipment (DCE)
- Data Terminal Equipment (DTE)

DCE peripheral devices usually refer to modems
DTE devices include terminals, computers and printers.

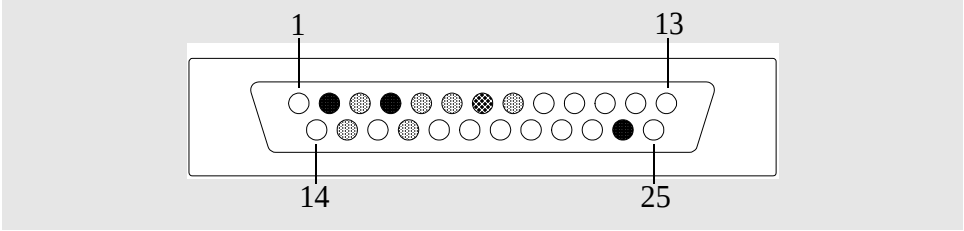
Cabling Overview

To connect a peripheral device to the Universal Communication Controller Improved, you need an interface cable to run electrical signals from one of the DB-25 connectors to the peripheral device. ADD-Engineering does not supply this cable. You can purchase ready-made cables at your local computer store or make them on your own

DCE and DTE devices send and receive signals through different pins. The UCCI is configured to be a DTE device. In general, when connecting a DCE-device to the DTE-interface of the UCCI use straight through cables.

Serial Connector Pinouts

Terminals, modems and printers typically communicate through an RS-232 (serial) interface. All of the UCCI's **synchronous/asynchronous** ports are DTE type RS-232 compatible serial connectors.



Serial connector Pin Diagram (male DTE)

Pin Number	RS-232 Signal	V.24 Signal	Direction
2	TxD	103	Output
3	RxD	104	Input
4	RTS	105	Output
5	CTS	106	Input
6	DSR	107	Input
7	Signal GND	-	None
8	DCD	109	Input
20	DTR	108/2	Output
15	TxCin	114	Input
17	RxCin	115	Input
24	TxCout	113	Output

Serial connector Pinout (male DTE)

Signal	Description
TxD	Transmit Data. Sends data to peripheral device
RxD	Receive Data. Receives data from the peripheral
RTS	Request To Send. Signal asking if peripheral device is ready to receive data
CTS	Clear To Send. Signal from the peripheral device indicating readiness to accept data
DSR	Data Set Ready. Signal from the peripheral indicating the status.
Signal GND	Signal Ground. Provides reference level for other signals
DCD	Data Carrier Detect. Signal indicating that the peripheral device has detected a signal from the remote peripheral device over the datacommunications channel
RxCin	Receive Data Clock. Input for receiver signal element timing from a synchronous DCE-device.
TxCin	Transmit Data Clock. Input for transmitter signal element timing from a synchronous DCE-device
DTR	Data Terminal Ready. Indicates that the local device is ready to communicate
TxCout	Transmit Data Clock. Output for transmitter signal element timing generated on the UCCI.

Pin Signal Description

Appendix C
ANFI Network Format

ANFI specifications

The following table provides an overview of the structure of the ANFI network format:

Nr	Field Name	Nr	Field Name
1	Identifier Byte 1	2	Identifier Byte 2
3	Header Length	4	Sequence Number
5	t[0]	6	t[1]
7	t[2]	8	t[3]
9	t ms[0]	10	t ms[1]
11	Packet Length[0]	12	Packet Length[1]
13	Channel Nr	14	Datatype
15	t ms offset[0]	16	t ms offset[1]
17	Frame Length[0]	18	Frame Length[1]
19	Frame Data[0]	20	Frame Data[1]
21	...	22	...

Table 1: ANFI packet specification

- Identifier Byte 1
  0x0A
- Identifier Byte 2
  0xDD
- Header Length
  The length of the complete header as the number of bytes comprising the header. The header ends where the frame header starts (the green block in the table). Although the header currently ends with the field “Packet Length[1]” this might be

changed in the future to accomodate more information in the header. Therefore, when implementing the ANFI network format one should always evaluate the header length.

- Sequence Number
  Increments with every ANFI packet, rolls over from 255 to 0.
- t[0]..t[3]
  The time and date in seconds counted from 1/1/1970 0:00. The t[0] is the LS-Byte of the timestamp.
- t ms[0]..t ms[1]
  The offset in milliseconds from t[0]..t[3]. The t ms[0] is the LS-Byte of the offset. Valid range is [0..999].
- Packet Length[0]..Packet Length[1]
  The length of the complete packet including all header data. Packet Length[0] is the LS-Byte of the packet length. Packet length has a maximum value of 65535.
- Channel Nr.
  The number of the channel that generated the data frame that follows. Channel number 0 is reserved for internal messages and should not be used. Any messages with channel number 0 should be ignored.Valid range for the Channel Nr is [1..8] although future version of the UCCI could extend this range to [1..32].
- Data Type
  The type of data in the frame that follows. See Table-2 “Data type definitions”.
- t ms offset[0]..t ms offset[1]
  The offset in milliseconds from the complete timestamp (seconds + milleseconds) in the packet header. In case the offset exceeds 60000, the offset will be maximized to 65535.
- Frame Length[0]..Frame Length[1]
  The length of the frame that follows (thus excluding the frame header). Frame length has a valid range of [0..(65535 - Frame Header Length - Packet Header Length)].
- Frame Data[0].....
  This part of the packet contains the payload. In case the payload consists of elements other than bytes (eg. words or double words), the LS-Byte is sent first. A new frame header can follow directly upon the frame data.

Value	Type of data
0	No statement on type of data, content is transparent.
1	Link-1 (STANAG-5501), start byte, 14 data bytes, 1 checksum byte
2	SIMPLE (STANAG-5602), Complete SIMPLE-packet
4	Link-4 (STANAG-5504),
11	Link-11B (STANAG-5511), 6 data bytes, 1 checksum byte
16	Link-16 (STANAG-5516)
22	Link-22 (STANAG-5522)
100	IJMS, 9 data words of 32 bits
101	Fwd Tell
102	Lat Tell
103	CD-2
104	Aircat 500
105	ATDL (7 data bytes, 1 checksum byte)
106-199	Reserved for future use
200-254	User Types
255	UCCI Management data

Table 2: Data type definition

Appendix D
UCCI Management Data

UCCI Management Data

The ANFI network format has a data type designation for UCCI management data. Within the “UCCI management data” type currently two data subtypes are defined:

- UCCI Channel Status Request
  When submitted to the UCCI and the UCCI is using the ANFI network format, the UCCI will reply with the UCCI Channel Status Report. Indicated with value ‘0’ in the Data Sub Type field.
- UCCI Channel Status Report
  On request the UCCI will transmit a channel status report with information on the channel’s CTS-line and statistics. Indicated with value ‘1’ in the Data Sub Type field.

Nr	Field Name	Nr	Field Name
1	Identifier Byte 1	2	Identifier Byte 2
3	Header Length	4	Sequence Number
5	t[0]	6	t[1]
7	t[2]	8	t[3]
9	t ms[0]	10	t ms[1]
11	Packet Length[0]	12	Packet Length[1]
13	Channel Nr	14	Datatype (value 255)
15	t ms offset[0]	16	t ms offset[1]
17	Frame Length[0] (value 1)	18	Frame Length[1] (value 0)
19	Data Sub Type(value 0, status req.)		

Table 3: UCCI Channel Status Request

Channel status request could be mixed with data to be transmitted on the serial line. There is no need to have the channel status request as the first frame of a ANFI-packet.

Nr	Field Name	Nr	Field Name
1	Identifier Byte 1	2	Identifier Byte 2
3	Header Length	4	Sequence Number
5	t[0]	6	t[1]
7	t[2]	8	t[3]
9	t ms[0]	10	t ms[1]
11	Packet Length[0]	12	Packet Length[1]
13	Channel Nr	14	Datatype, (value 255)
15	t ms offset[0]	16	t ms offset[1]
17	Frame Length[0], (value 30)	18	Frame Length[1], (value 0)
19	Frame Data[0] (value 1, status report)	20	CTS
21	Tx Buffer Content[0]	22	Tx Buffer Content[1]
23	Tx Buffer Content[2]	24	Tx Buffer Content[3]
25	Rx Bytes[0]	26	Rx Bytes[1]
27	Rx Bytes[2]	28	Rx Bytes[3]
29	Rx Frames[0]	30	Rx Frames[1]
31	Rx Frames[2]	32	Rx Frames[3]
33	Rx Idles[0]	34	Rx Idles[1]
35	Rx Idles[2]	36	Rx Idles[3]
37	Rx Errors[0]	38	Rx Errors[1]
39	Rx Errors[2]	40	Rx Errors[3]
41	Tx Bytes[0]	42	Tx Bytes[1]
43	Tx Bytes[2]	44	Tx Bytes[3]
45	Tx Frames[0]	46	Tx Frames[1]
47	Tx Frames[2]	48	Tx Frames[3]

Table 4: UCCI Channel Status Report

Channel status reports could be mixed with data received from the serial line. There is no guarantee that the UCCI responds with the channel status report as the first frame of a ANFI-packet. For all fields the byte at position [0] is the LS-byte.

- CTS
  The status of the Clear To Send line of the specific channel. A ‘0’ indicates that the CTS-line is inactive and a ‘1’ indicates that the CTS-line is active.
- Tx Buffer Content[0]..Tx Buffer Content[3]
  Indicates the content of the serial transmit buffer.

- Rx Bytes[0]..Rx Bytes[3]
  Indicates the number of bytes received on the serial channel.
- Rx Frames[0]..Rx Frames[3]
  Indicates the number of frames received on the serial channel.
- Rx Idles[0]..Rx Idles[3]
  Indicates the number of idles received on the serial channel.
- Rx Errors[0]..Rx Errors[3]
  Indicates the number of CRC or checksum errors detected on the receive side of the serial channel (when applicable).
- Tx Bytes[0]..Tx Bytes[3]
  Indicates the number of bytes transmitted on the serial channel.
- Tx Frames[0]..Tx Frames[3]
  Indicates the number of frames transmitted on the serial channel.

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